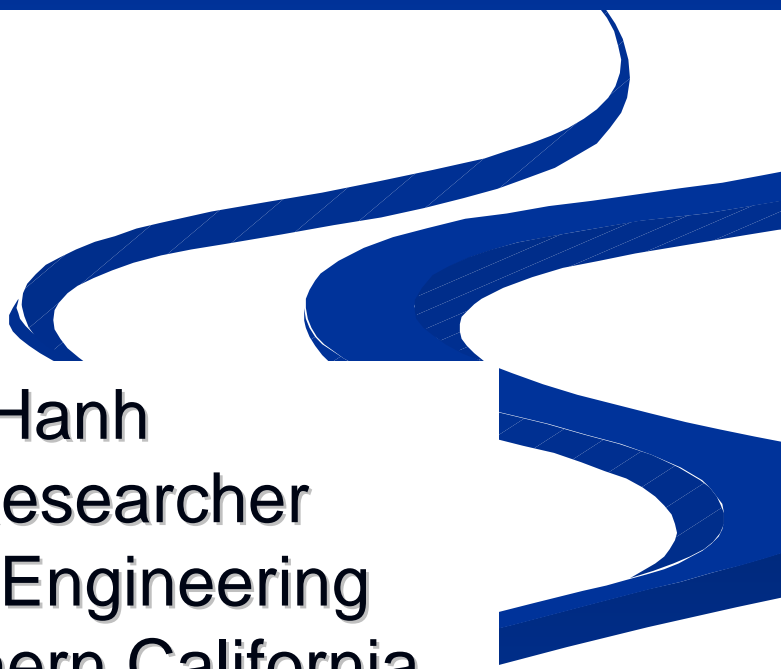


15<sup>th</sup> ITPS Symposium, Tokyo

# **Trade Imbalance and the Rationalized Movement of Empty Containers**



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# Presentation Outline

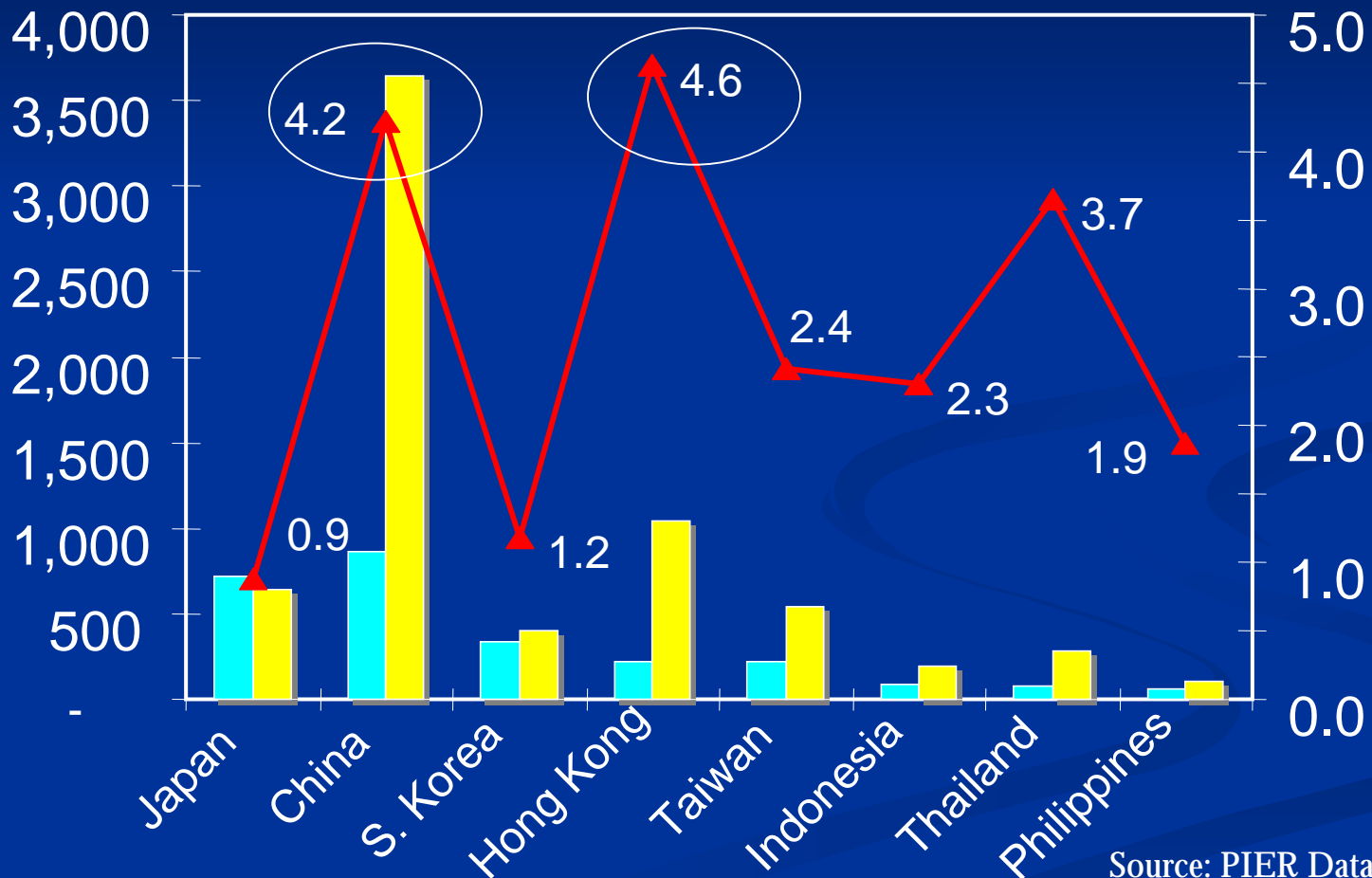
- Trade Imbalance and the Local Impact of Empty Container Problems
- Analysis of Current Empty Container Movements and Logistics Practices
- Solutions to Rationalizing the Movement of Empty Containers—Local/Regional System Improvement
- Conclusions

# I. **Trade Imbalance and the Local Impact of Empty Container Problems**

“ The first cousin of increased empty containers is local congestion and air quality problems...”

# Trans-Pacific Trade Imbalance (TEU) To/From US West Coast in 2003

(*'000 TEU*)      ■ To US   ■ From US   ▲ Imbalance Index



Source: PIER Data 2004

# Dynamics of International Trade and Empty Container Surplus/Deficit Regions

Tran-Pacific Trade Volume (TEU) by Country in 2003

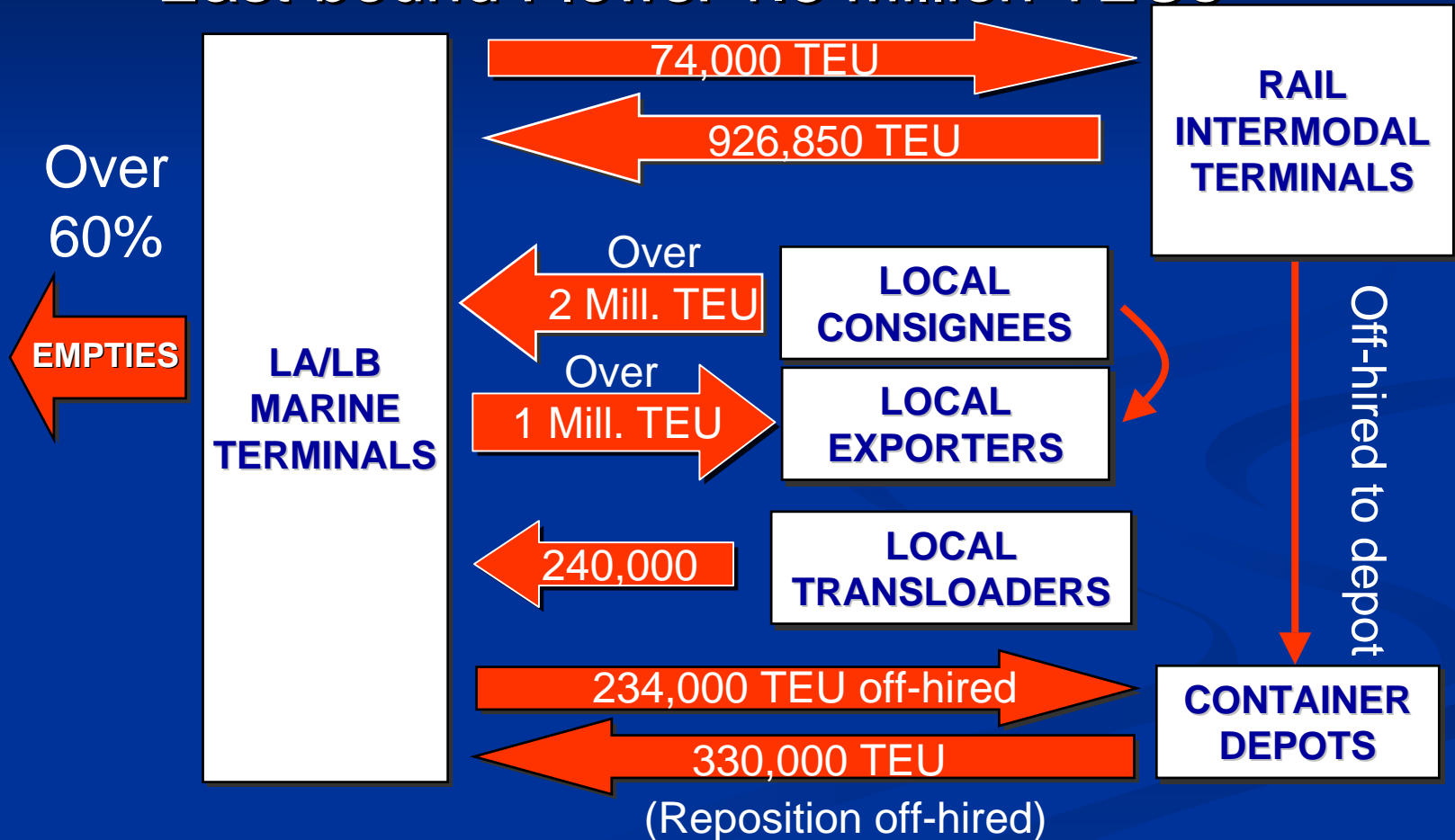
Trading Partner	To US	From US	Empty Surplus/ Deficit Region
Japan	638,303	723,168	84,865
China (HK)	4,690,935	1,088,520	-3,602,415
<i>(China only)</i>	3,646,228	862,662	-2,783,566
Korea	397,448	336,671	-60,777
Taiwan	545,507	225,483	-320,024
Thailand	288,655	78,966	-209,318
Indonesia	198,527	86,209	-112,529
Total	6,759,375	2,539,017	-4,220,358

Source: Created from PIER Data

# Inefficient Empty Container Movements

West-bound Flows: 3.5 Million TEUs

East-bound Flows: 1.3 Million TEUs



# Implications of Container Truck Traffic - Congestion and Air Quality -



During Port Lockout (2002)

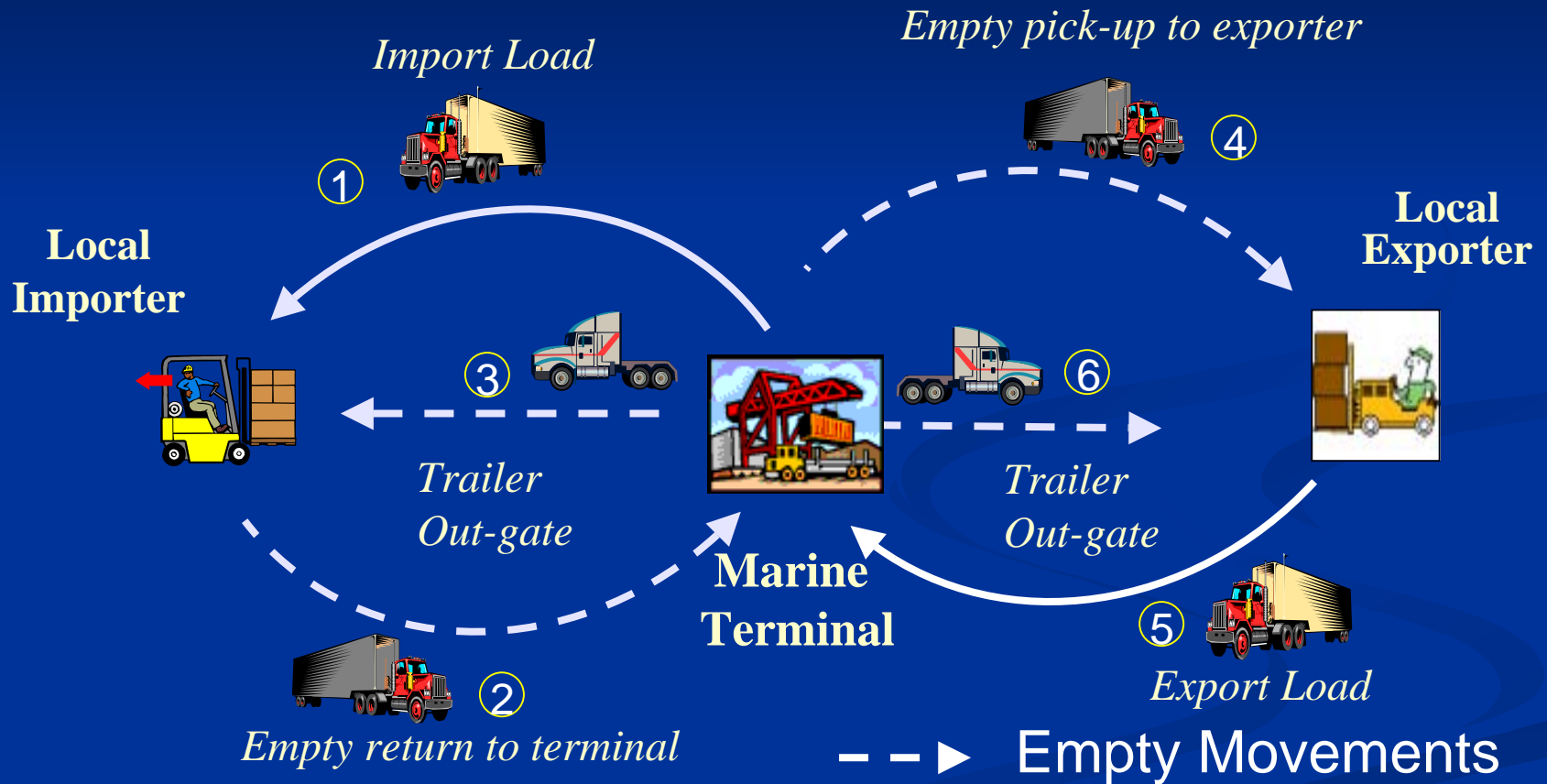


Normal Day

# **II. Analysis of Current Empty Container Movement and Logistics Practices**



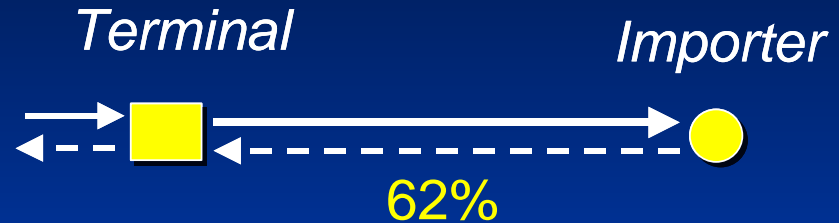
# Current Industry Practices of Empty Container Logistics



## Handling Cycle of a Container

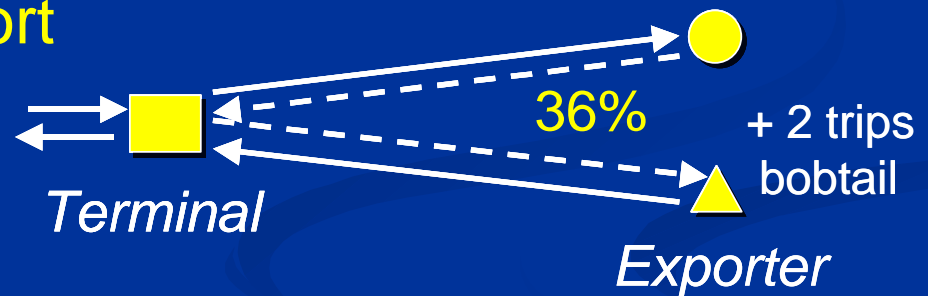
# Typical Movement Patterns of Empty Containers

## 1. No re-use of empty for local export

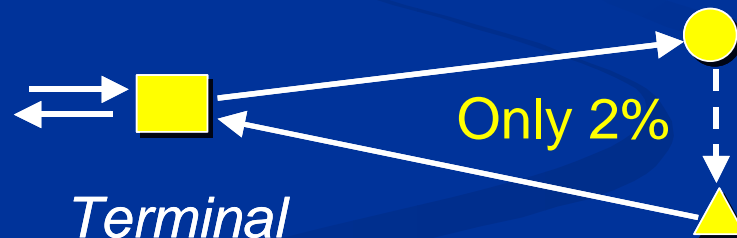


## 2. Reused for local export

a) First Return to terminal



b) Direct Interchange or street-turn



# Factors Limiting Container Re-use and Direct Interchange

- Trade imbalance
- Import/export timing or location mismatch
- Type mismatch (wrong size, wrong type, or wrong chassis)
- Ownership mismatch (wrong steamship line)
- Lack of steamship line incentives
- Institutional barriers

# Structural Issues Limits Direct Interchange of Empty Containers

## ■ Container Ownership Issue

- 50% to 80% of containers are owned by ocean carriers
- “Slim inventory” is key in management strategy
- Maintain total control over equipments is important
- Carriers reluctant to share containers to other carriers

## ■ Container Liability Issue

- Specific liability agreements with a trucking firm
- Problem of allocating damage responsibility at transfer

# Operational Issues (continue)

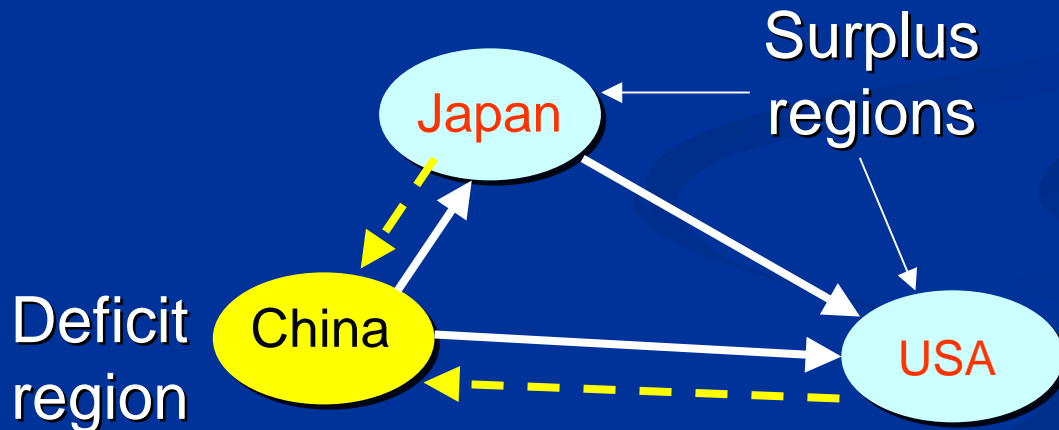
- The “storefront” character of empty containers
  - From **Equipment** in nature to **Service** in character
  - Availability of empty containers at a particular place and time become **commercially valuable**
  - Differentiating a carrier from other competitors

*Carrier reluctant to cooperate with other carriers to address the empty container problem.*

# Efficient Global Logistics Management of Container Inventory

## Reposition Costs vs. Service Opportunities Trade-Off

Regional inefficient movements and the efficient performance of the global container inventory operations

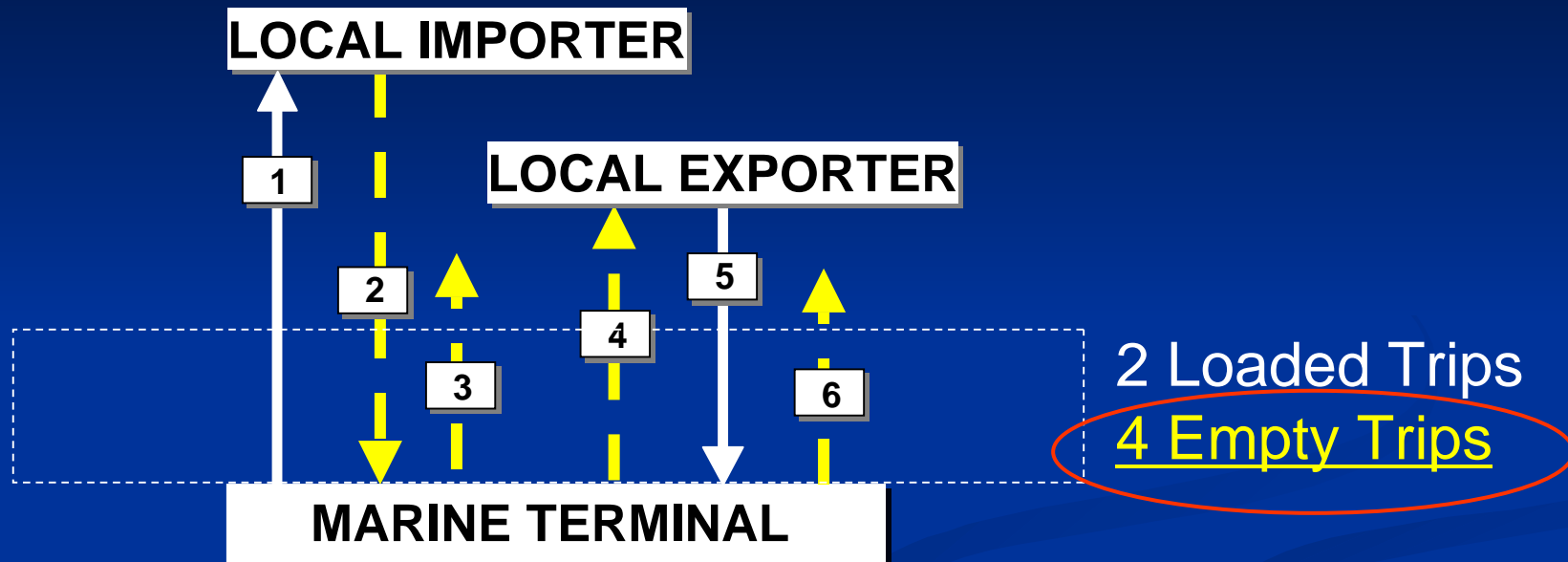


Reposition empty containers to Asia as soon as possible

# **III.**

## **The Rationalizing Movement of Empty Containers: Regional System Improvement**

# Excessive Empty Trips Generation



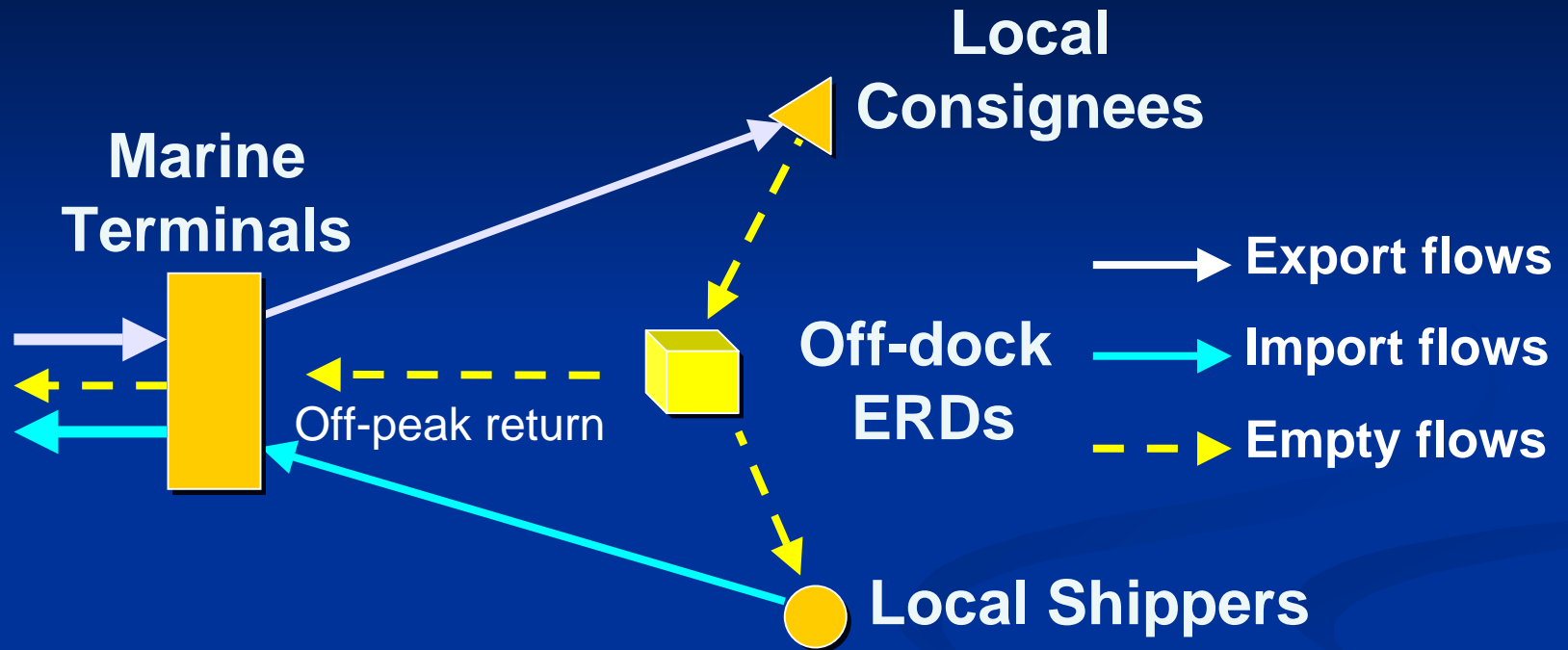
1. Loaded import container move to importer
2. Empty container return to terminal
3. Trailer out-gate (to next assignment)
4. Empty container move from terminal to exporter
5. Loaded export container move to terminal
6. Trailer out-gate (to next assignment)



# **Rationalization of Empty Container Movements:**

- **Potential Regional System Improvements**
  - a. Off-Dock Empty Return Depots
  - b. Direct Interchange to Reuse Empty Containers
  - c. Internet Systems: Virtual Container Yards
  - d. Depot Direct Off-hire of Empty Leased Containers
  - e. Gray Box—Neutral containers pool
  - g. Collapsible Containers

## a. Off-Dock Empty Return Depots (ERDs)



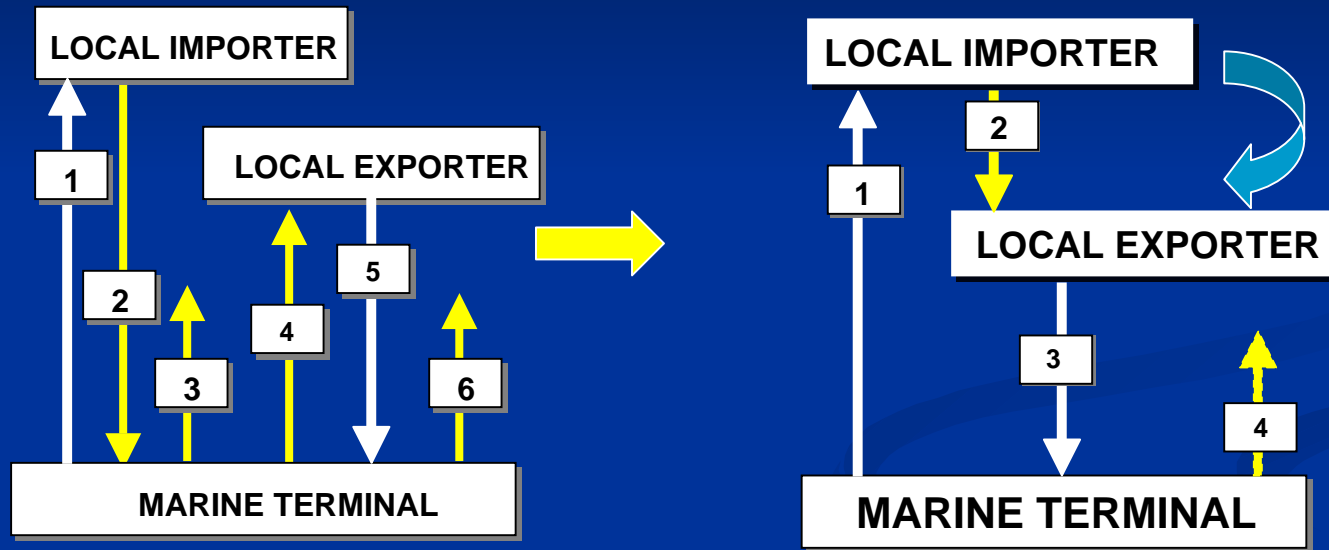
- Serving as a buffer storage or neutral points for interchanges and re-use of empty container.
- Diverting truck trip to off-peak period

# Conflicting Interest in ERDs

- **Local Community: Strongly support**
  - Reduce truck trips, VMT and congestion
  - Improved air quality, noise and safety
  - Cities willing to accept new ERD facility?
- **Ocean Carriers:**
  - It complicates carrier's inventory control
  - Less efficient given the increased trade imbalance
  - Increase carrier's operation and investment costs
- **Drayage/trucking firms:**
  - Effective way to avoid congestion at terminal gate
  - Reduce a trip time, increase productivity

## b. Empty Container Re-use: Direct Interchange or “Street Turn”

Current Empty Return    Empty Reuse/Street Turn



1. Loaded import container move to importer
2. Empty return to terminal
3. Bobtail out-gate (to next assignment)
4. Empty container move to exporter
5. Loaded export container move to terminal
6. Out-gate (to next assignment)

1. Loaded import container move to importer
2. Empty cross-town to exporter
3. Loaded export container move to terminal
4. Trailer out-gate (to the next assignment)

Source: Empty Container Study (2001)

( C ) Dr. Le Dam HANH, Institute for Transport Policy Studies, 2004

# Empty Flows Estimate: Base Case—LB/LA Ports

TEUs		2000	2010	2020
<b>Port Inbound/Eastbound</b>		<b>1,324,476</b>	<b>2,738,344</b>	<b>5,027,971</b>
Via Rail		22,169	80,413	170,494
Via Truck		1,302,306	2,657,931	4,857,476
<b>Port Outbound/Westbound</b>		<b>3,568,312</b>	<b>6,367,713</b>	<b>14,440,698</b>
Via Rail		278,128	501,602	1,084,536
Via Truck		3,290,183	5,866,112	13,356,161
<b>Cross-Town Truck</b>	<b>Factor</b>	<b>149,184</b>	<b>268,159</b>	<b>602,663</b>
Local Off-Hires to Depots	3%	80,577	146,796	323,278
IM Off-Hires to Depots	3%	19,469	31,738	81,601
<i>Reused empties for exports</i>	<i>2%</i>	<i>49,138</i>	<i>89,624</i>	<i>197,784</i>
<b>Grand Total</b>		<b>5,041,972</b>	<b>9,374,216</b>	<b>20,071,332</b>

# Total Empty Trips Reduction Impact

	2000	2010	2020
<b>Base Case</b>	<b>5,041,972</b>	<b>9,375,000</b>	<b>20,100,000</b>
Tier I <b>5% Reuse</b>	4,955,734	9,083,000	19,428,000
<b><i>Trips Saved</i></b>	<b><i>1,600,000</i></b>	<b><i>292,000</i></b>	<b><i>644,000</i></b>
Tier II <b>10% Reuse</b>	4,616,000	8,596,000	18,355,000
<b><i>Trips Saved</i></b>	<b><i>430,000</i></b>	<b><i>778,000</i></b>	<b><i>1,717,000</i></b>
Depot-Direct <b>10%</b>	4,890,000	8,958,000	19,127,000
<b><i>Trips Saved</i></b>	<b><i>234,000</i></b>	<b><i>417,000</i></b>	<b><i>945,000</i></b>
Combined Scenario	4,400,000	8,205,000	17,465,000
<b><i>Total Trips Saved</i></b>	<b><i>646,000</i></b>	<b><i>1,170,000</i></b>	<b><i>2,607,000</i></b>

# Average Trip Length by Trip Type

<b>Trip Type</b>	<b>Average Miles</b>
<b>Eastbound</b>	
Off-Dock Intermodal	14
Local for Export Loading	15
SSL Off-Hires to Depots	4
<b>Westbound</b>	
Off-Dock Intermodal	14
Local for Import Loading	15
Local from WB Domestic Loads	30
Repo Off-Hires from Depots	4
Local Empties form Transloads	10
Bobtails	15
<b>Cross-Town</b>	
Local Off-Hires to Depots	11
IM Off-Hires to Depots	10
Re-used empty for Export	15

# Estimated Total VMT Impacts

Reduce Annual VMT by over 7 million in 2010

	2000	2010	2020
<b>Base Case</b>	<b>34,385,909</b>	<b>64,040,254</b>	<b>136,322,325</b>
<b>Tier I - 5% Reuse</b>	<b>33,188,403</b>	<b>61,852,813</b>	<b>131,494,795</b>
<i><b>VMT Reduction</b></i>	<i><b>1,197,505</b></i>	<i><b>2,187,441</b></i>	<i><b>4,827,530</b></i>
<b>Tier II - 10% Reuse</b>	<b>31,192,561</b>	<b>58,207,077</b>	<b>123,448,912</b>
<i><b>VMT Reduction</b></i>	<i><b>3,193,347</b></i>	<i><b>5,833,177</b></i>	<i><b>12,873,414</b></i>
<b>Depot-Direct 10%</b>	<b>33,376,434</b>	<b>62,238,830</b>	<b>132,237,056</b>
<i><b>VMT Reduction</b></i>	<i><b>1,009,474</b></i>	<i><b>1,801,424</b></i>	<i><b>4,085,269</b></i>
<b>Combined Scenario</b>	<b>30,242,584</b>	<b>56,514,171</b>	<b>119,603,121</b>
<i><b>VMT Reduction</b></i>	<i><b>4,143,324</b></i>	<i><b>7,526,083</b></i>	<i><b>16,719,205</b></i>



# Estimated Emissions Impacts

Scenario & Emission Type	2000		2020	
	Annual Tons	Peak Day Tons	Annual Tons	Peak Day Tons
<b>Base Case</b>				
Carbon Monoxide	497	2.14	1,970	8.48
Total Organic Gases	113	0.49	449	1.93
Reactive Organic Gases	111	0.48	438	1.89
Oxides of Nitrogen	420	1.81	1,666	7.17
Exhaust Particulates	39	0.17	155	0.67
<b>Combined Scenario</b>				
Carbon Monoxide (CO)	437	1.88	1,728	7.44
<b>Reduction</b>	<b>60</b>	<b>0.26</b>	<b>242</b>	<b>1.04</b>
Total Organic Gases	100	0.43	394	1.7
<b>Reduction</b>	<b>14</b>	<b>0.6</b>	<b>55</b>	<b>0.24</b>
Reactive Organic Gases	97	0.42	385	1.66
<b>Reduction</b>	<b>13</b>	<b>0.06</b>	<b>54</b>	<b>0.23</b>
Oxides of Nitrogen (Nox)	370	1.59	1,462	6.29
<b>Reduction</b>	<b>51</b>	<b>0.22</b>	<b>204</b>	<b>0.88</b>
Exhaust Particulates	34	0.15	136	0.58
<b>Reduction</b>	<b>5</b>	<b>0.02</b>	<b>19</b>	<b>0.08</b>

# **Institutional Issues that Limit Direct Interchange**

- Carrier's contracts that do not allow interchange or make the first trucker liable
- Need for inspection and paper work when interchange
- Lack of a standard or consistent procedure for trucker interchange
- Difficulty of tracking per diem and repair charges
- Limited free-time (3-5 days)

# What Do We Need to Increase the Direct Interchange of Empty

- Carrier's participation and cooperation in sharing container status information
- Availability of accurate, real-time information is a key to maximizing container re-use
- Carrier's authorization and standard liability transfer procedure and documentations



Internet Based Systems: “Virtual Container Yard” (VCY)

## c. Virtual Container Yard Using Internet Systems

### What is the virtual container yard ?

- Common platform for posting useful information about containers for potential reuse
- Facilitate re-use decisions and necessary interchange procedures and documentation electronically

# Virtual CY Information Needs

<i>Info Source</i>	<i>Container Info</i>	<i>Chassis Info</i>
Ocean Carrier	Box Serial No.	Chassis Serial No.
	Box Type & Specs	Chassis Type
	Reuse Limits	Reuse Limits
	Return Location	Return Location
	Free Time/Per Diem	Free Time/Per Diem
Trucker	Location	Location
	Time/Date when Available	Time/Date when Available

# Third Party Provider Internet Systems



E-modal.com

VoyagerTrack.com

Synchronet.com

SynchroMet.com

# SynchroMet.com—Virtual CY Service Port of Oakland Community

## Provides Motor Carriers with the ability to:

- Communicate street inventory or equipment needs
- Facilitate a street turn transaction with Ocean Carrier approval
- Generate an EIR and transfer liability for the equipment
- Access empty equipment direct from local ramps and depots

## Provides Ocean Carriers with the ability to:

- Authorize individual street turn requests on-line
- Dispatch equipment from local ramps and depots
- Incorporate required business rules and special terms
- Automate the confirmation process via EDI

# Technology to Benefit Everyone

## Who would benefit and how?

- **Truckers** would avoid non-revenue return moves and terminal gate congestion, and improve driver productivity
- **Ocean carriers** would improve equipment utilization and reduce long-run trucking costs
- Export **shippers** would receive improved equipment supply
- **Local community** and public would benefit through reduced total truck VMT, emissions, congestion, and increased safety



# Conclusions (1)

- Ocean carriers are willing to tolerate the regional inefficient movement of empty containers as a means of optimizing the overall performance of their global inventory operation.
- For carriers, the established pattern of empty container movements is optimal within existing institutional and market constraints
- Public sector role is limited:  
Most institutional issues are outside public influence

# Conclusion (2)

- Information systems will provide new tools and venues for ocean carriers and drayage firms to improve the efficient movement and allocation of empty containers without scarifying business opportunities
- Local government incentives may necessary to support these systems in the early stages of development and industry out-reach

# Thank You